

## Improving quality of life in patients with chronic kidney disease: influence of acceptance and personality

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### Abstract

**Background.** A low health-related quality of life (HQL) is associated with the evolution of chronic kidney disease (CKD) and mortality in patients in end-stage of the disease. Therefore research on psychological determinants of HQL is emerging. We investigate whether acceptance of the disease contributes to a better physical and mental health-related quality of life (PHQL and MHQL). We also examine the impact of personality characteristics on acceptance, PHQL and MHQL.

**Methods.** In this cross-sectional study, patients from an outpatient clinic of nephrology completed self-report questionnaires on quality of life, acceptance and personality characteristics. We performed correlations, regression analyses and a path analysis.

**Results.** Our sample of 99 patients had a mean duration of CKD of 10.81 years and a mean estimated Glomerular Filtration Rate (eGFR) by Modification of Diet in Renal Disease (MDRD)-formula of 34.49 ml/min (SD 21.66). Regression analyses revealed that acceptance had a significant positive contribution to the prediction of PHQL and MHQL. Neuroticism was negatively associated with acceptance and MHQL. Path analysis showed that 37% of the total effect of neuroticism on MHQL was mediated by acceptance.

**Conclusions.** Acceptance is an important positive variable in accounting for HQL, however, clinicians must be aware that if patients have a high level of neuroticism they are likely to have more difficulties with this coping strategy. These results provide a better understanding of psychological determinants of HQL in CKD, which can initiate another approach of these patients by nephrologists, specific psychological interventions, or other supporting public health services.

**Keywords:** acceptance; chronic kidney disease; health-related quality of life; neuroticism; personality characteristics

### Introduction

Chronic kidney disease (CKD) is a major health problem worldwide, with a prevalence that increases with age [1]

and with a significant negative effect on the health-related quality of life (HQL). HQL is associated with risk of evolution to end-stage kidney disease and increased mortality in those end-stage patients [2–4]. Because of its high impact, research on HQL in CKD has increased over the years. Reported satisfaction of haemodialysis patients with their personal health is positively correlated with HQL. Negative mental health, e.g. depression, high psychological distress and psychiatric disorders, all of which are prevalent amongst CKD patients, is a negative predictor of HQL in CKD [5–17]. Folkman and Greer [18] suggested that in addition to a symptom-orientated approach to general chronic illness, there should be more focus on achieving psychological well-being. We have focussed our study on ‘acceptance’ as a possible positive predictor of well-being or HQL.

Accommodative coping has been described as appropriate for a good psychological adjustment to unchangeable events [19, 20] and is commonly defined as ‘adjusting preferences and goals in line with experienced constraints and limitations’, e.g. because of chronic disease. Within this coping strategy, acceptance is considered a key variable. When patients accept the disease, it is assumed that they will adjust their life goals towards more achievable goals by integrating this difficult life event [19, 21]. Chronic diseases are seen as life events, which upset a person’s emotional balance, and acceptance is crucial establishing a new balance. When patients with chronic pain and chronic fatigue refuse to accept their medical situation and use an assimilative coping strategy, which is characterized by persisting in attempts to seek a cure for the medical problem, at the cost of other valued life goals, they report more catastrophizing and a lower mental HQL (MHQL) [22–25]. Also in cardiac patients [26], acceptance positively predicts physical functioning and mental well-being, whereas helplessness has a negative influence. For CKD, type of coping strategy is associated with compliance [27], and in patients with end-stage renal disease, there is evidence that avoidant coping is related to mortality [28]. The five-factor model of personality has been frequently used in research exploring the relationship between personality and coping [29–38]. The personality characteristics of the Big Five Personality model are: neuroticism, extraversion, openness,

agreeableness and conscientiousness. For CKD, it has been found that conscientiousness is associated with better compliance with prescribed medication [27] and neuroticism is related to outcome measures such as perceived mental health, psychosocial adjustment and coping [32, 39, 40]. Neuroticism also appears to be associated with a wide range of disorders of physical health, including kidney disease [41]. However, little is known about the role that personality characteristics have on acceptance.

This study in a CKD population evaluates (i) whether acceptance is associated with a better health quality of life, both physical (PHQL) and mental (MHQL) and (ii) whether personality characteristics influence acceptance and HQL (PHQL and MHQL), even after controlling for some putative confounding variables. We further hypothesize that the personality characteristic neuroticism has a negative influence on acceptance, important for a good MHQL.

## Materials and methods

### Study design

We performed a cross-sectional questionnaire study on the following variables: acceptance, personality characteristics and PHQL and MHQL. We included demographic, disease and co-morbidity variables in our analyses to check for putative confounding effects.

### Setting and participants

Data collection was performed in the outpatient clinic of the Nephrology department of the Ghent University Hospital, from January 2009 to August 2010. It was a consecutive recruitment in which patients were invited during an information session by a nurse to participate in the questionnaire study, after their visit to the nephrologist. All patients signed an informed consent form that was approved by the local ethics committee of the Ghent University Hospital.

Inclusion criteria of the study were as followed: knowledge of Dutch language, age >18 years and the diagnosis of CKD.

### Measurements

We used self-report questionnaires to assess the following variables: HQL (SF-36), acceptance [Illness cognition questionnaire (ICQ)] and personality [NEO-Five Factor Inventory (NEO-FFI)]. All participants completed the questionnaires described below.

**Short form health survey (SF-36) [42].** The SF-36 includes 36 items in eight subscales, assessing a general HQL. There is a physical and mental health component (PHQL and MHQL) in addition to the general health quality score (HQL). The items were scored on a 2- to 6-point scale, transformed in scale values from '0–100'. The SF-36 has been proven to be a reliable and valid instrument to assess HQL. In our sample, the Cronbach's alpha coefficients for the PHQL (0.88) and MHQL (0.87) are in line with other studies, which show Cronbach's alpha coefficients of 0.90 for these summary scores [42].

**Illness cognition questionnaire [43].** 'Accommodative coping' is a central variable in our study and was operationalized by the subscale acceptance of the Dutch version of the ICQ. For our analyses, we only used the acceptance subscale of the ICQ. This questionnaire (18 items) consists of three subscales (each 6 items): acceptance (e.g. 'I have learned to accept the disability of my disease'), 'helplessness' and 'disease benefits'. Items were scored on a 4-point scale with a range from 1 to 4 with a maximum score of 24. The Dutch version of the ICQ is considered a reliable and valid instrument, reporting Cronbach's alpha of 0.90 for the acceptance subscale [43]. In our sample, the Cronbach's alpha coefficient is 0.88.

**NEO-Five Factor Inventory [44].** 'Personality characteristics' were measured by the Dutch version of the revised NEO-FFI Personality Inventory based on the Big Five Personality model. This 60-item questionnaire measures five personality characteristics (each characteristic 12

items) of the Big Five Personality model: neuroticism, extraversion, openness, agreeableness and conscientiousness. Items were scored on a 4-point scale (from '0 = totally not agree' to '4 = totally agree'). Research has shown that the NEO-FFI is sufficiently reliable (alpha coefficients vary between 0.68 and 0.86) [44]. The Cronbach's alpha coefficient in our sample is 0.76. Also, the construct and concurrent validity has been well documented.

### Statistical methods

Missing data were most often due to missing information in medical files and insufficient responses of the participants. Data were analysed with SPSS version 12.0 and AMOS (SPSS, Inc., Chicago, IL).

Correlation analyses were performed. We focussed on the relations between the studied psychological variables (acceptance and personality characteristics) and PHQL and MHQL.

Next, we performed a series of regression analyses. In two regression analyses, we investigated the unique value of acceptance in explaining physical and mental well-being. In both analyses, age and gender were entered first into the regression. Next, the disease characteristics (duration of the disease, severity: eGFR by MDRD, dialysis condition, transplant condition) and comorbidity characteristics (presence of polycystic kidney disease, glomerulonephritis, diabetes mellitus, arterial hypertension, cardiovascular problems, stroke) were entered using a stepwise including method. In a last block, acceptance and the personality dimensions (neuroticism, extraversion, openness, agreeableness and conscientiousness) were entered using a stepwise inclusion method.

A third regression analysis (acceptance as dependent variable) was performed to investigate the role of personality variables in explaining acceptance. In this regression analyses, the personality variables were entered via the stepwise inclusion method.

Finally we did a path analysis (structural equation model), in which we took also the relation between PHQL and MHQL into account [45, 46]. The path analysis was estimated and tested with the maximum likelihood algorithm, which is known to be asymptotically efficient and to give correct chi-square estimators if there is not too much multivariate kurtosis. The indices used in the path analysis for goodness-of-fit modelling were chi-square and its related degrees of freedom (*df*), probability (*P*), goodness-of-fit index (GFI), adjusted GFI (AGFI), comparative fit index (CFI), root mean square error of approximation (RMSEA) and the Consistent Akaike Information Criterion (CAIC). Chi-square assesses whether a significant amount of observed covariance between items remains unexplained by the model. A significant chi-square (e.g.  $P < 0.05$ ) indicates a bad model fit. The RMSEA is a fit measure based on population error of approximation because it is difficult to assume that the model will hold exactly for the population. Therefore, the RMSEA takes into account the error of approximation in the population. An RMSEA value  $< 0.05$  indicates a close fit and values up to 0.08 represent reasonable errors of approximation in the population.

The GFI and AGFI assess the extent to which the model provides a better fit compared to no model at all. These indices have a range between 0 and 1, with higher values indicating a better fit. A GFI  $> 0.90$  and an AGFI  $> 0.85$  indicate a good fit of the model. The CFI is an incremental fit index [47] and represents the proportionate improvement in a model fit by comparing the target model with a baseline model (usually, a null model in which all the observed variables are uncorrelated). The CFI ranges between 0 and 1, with values  $> 0.90$  indicating an adequate fit.

The CAIC is a goodness-of-fit measure that adjusts the model's chi-square to penalize for model complexity and sample size. This measure can be used to compare non-hierarchical as hierarchical (nested) models. Lower values on the CAIC measure indicate better fit.

## Results

### Participants

The nurses of the Nephrology team invited 170 patients to participate in the study. Using a thick-box system, it was ensured that every patient was only invited once; 155

patients agreed to take the questionnaires home. The main reasons for not taking part in the study were the following: workload because of the amount of questions, resistance due to the psychological aspect of the study, and patients believing that questions may be too difficult to answer without help. Between January 2009 and December 2010, 105 questionnaires were returned. Six patients did not fill out the questionnaires sufficiently, resulting in a sample of 99 patients (30 women and 69 men) with a mean duration of CKD of 10.81 years. Most patients (65) were married. With regard to the education level, our sample consisted of 73 patients who finished secondary school, 20 were college graduates and 6 were university graduates. Of the 99 patients, 26 were employed, 37 were retired and 18 were on sick leave and dependent on health insurance.

According to the classification of CKD severity, based on eGFR by MDRD equation, our sample showed mean eGFR by MDRD 34.5 mL/min (SD 21.66), corresponding to Phase 3b (Phase 1: >90, Phase 2: 80–89, Phase 3a: 45–59, Phase 3b: 30–45, Phase 4: 15–29 and Phase 5: <15).

Disease-relevant laboratory characteristics data were collected from patients' electronic medical files and are presented in Table 1.

Co-morbidity in our sample consisted of: arterial hypertension ( $n = 54$ ), diabetes mellitus ( $n = 30$ ), cardiovascular disease ( $n = 27$ ), glomerulonephritis ( $n = 13$ ), polycystic kidney disease ( $n = 11$ ), CVA ( $n = 5$ ) and other diseases

( $n = 76$ ). Thirty-four of our patients were on haemodialysis at the time of measurement.

### Main results

**Correlation analyses.** Table 2 provides the Pearson correlations amongst the variables. Acceptance was positively correlated with MHQL ( $r = 0.56$ ,  $P < 0.01$ ) and positively correlated with PHQL ( $r = 0.45$ ,  $P < 0.01$ ). Neuroticism showed negative correlations with acceptance ( $r = -0.49$ ,  $P < 0.01$ ) and with MHQL ( $r = -0.52$ ,  $P < 0.01$ ) (Table 2).

**Multiple regression analysis.** In our first regression analyses, the unique role of acceptance in explaining physical well-being (PHQL as dependent variable) was investigated. Results can be summarized as follows. Age and gender did not contribute in predicting PHQL. From the disease and co-morbidity variables that were entered stepwise, only arterial hypertension did significantly contribute in PHQL [ $\beta = -0.23$ ,  $P < 0.05$ ;  $F_{\text{change}}(1,91) = 4.780$ ,  $P < 0.003$ ,  $R^2_{\text{change}} = 0.05$ ]. However, arterial hypertension was no longer significant in the final model, when acceptance and the personality characteristics were entered. Acceptance accounted for an additional variance of 18% in PHQL [ $\beta = 0.43$ ,  $P < 0.001$ ;  $F_{\text{change}}(1,90) = 21.68$ ,  $P < 0.001$ ,  $R^2_{\text{change}} = 0.18$ ]. The final model explained 23% of variance in the PHQL scores [adjusted  $R^2 = 0.23$ ,  $F(4,90) = 7.945$ ,  $P < 0.001$ ].

**Table 1.** Descriptive statistics: laboratory characteristics

Analyse (unit)	N	Minimum	Maximum	Mean	SD
Total protein (g/dL)	97	3.60	9.40	6.93	0.74
Albumin (g/dL)	69	2.30	4.90	4.05	0.48
Phosphorus (mg/dL)	98	1.64	7.70	3.57	0.92
Cholesterol (mg/dL)	86	106.00	290.00	187.37	41.08
HbA1c (%)	48	4.80	11.80	6.35	1.41
Haemoglobin (g/dL)	99	8.10	15.90	12.35	1.69
C-reactive protein (mg/dL)	99	0.03	6.50	0.64	0.93
Creatinine (mg/dL)	99	0.62	14.53	3.06	2.77
eGFR by MDRD (mL/min)	99	3.60	103.50	34.49	21.66

**Table 2.** Means, SD, Cronbach's alphas and Pearson correlations

Serial no.	Variable	Means (SD)	Cronbach alpha	2	3	4	5	6	7	8	9	10	11	
1	Age	56.48 (14.26)			−0.08	−0.08	0.13	−0.15	−0.12	−0.02	0.01	−0.11	−0.09	−0.02
2	Severity (eGFR by MDRD)	34.49 (21.66)				0.35 <sup>b</sup>	0.08	0.09	0.13	−0.04	0.15	0.02	0.03	−0.04
3	Duration	10.75 (12.60)					0.18	−0.01	0.19	−0.09	0.04	−0.21 <sup>a</sup>	0.18	0.11
4	Acceptance (ICQ)	16.84 (4.11)	0.88					0.34 <sup>b</sup>	0.19	−0.05	0.28 <sup>b</sup>	−0.49 <sup>b</sup>	0.45 <sup>b</sup>	0.56 <sup>b</sup>
5	Extraversion (NEO-FFI)	38.95 (6.79)	0.76						0.17	0.14	0.56 <sup>b</sup>	−0.37 <sup>b</sup>	0.19	0.32 <sup>b</sup>
6	Openness (NEO-FFI)	34.34 (6.12)	0.63							0.16	0.09	−0.09	0.19	0.18
7	Agreeableness (NEO-FFI)	43.94 (6.33)	0.75								0.35 <sup>b</sup>	0.06	−0.03	0.01
8	Conscientiousness (NEO-FFI)	44.03 (6.40)	0.75									−0.32 <sup>b</sup>	0.20 <sup>a</sup>	0.18
9	Neuroticism (NEO-FFI)	31.35 (7.45)	0.76										−0.24 <sup>a</sup>	−0.52 <sup>b</sup>
10	PHQL (SF-36)	52.43 (22.28)	0.88											0.69 <sup>b</sup>
11	MHQL (SF-36)	65.90 (20.32)	0.87											

<sup>a</sup>Correlation is significant at the 0.05 level (two-tailed).

<sup>b</sup>Correlation is significant at the 0.01 level (two-tailed).

The second regression analysis with MHQL as a dependent variable showed that both acceptance and neuroticism have a significant contribution in explaining MHQL, 31% of the variance was additionally explained by acceptance [ $\beta = 0.41$ ,  $P < 0.001$ ,  $F_{\text{change}}(1,91) = 42.43$ ,  $P < 0.001$ ,  $R^2_{\text{change}} = 0.31$ ]. Neuroticism accounted for an additional variance of 8% in MHQL, [ $\beta = -0.33$ ,  $P < 0.005$ ,  $F_{\text{change}}(1,90) = 12.16$ ,  $P < 0.001$ ,  $R^2_{\text{change}} = 0.08$ ]. For MHQL, 38% of variance was explained by the final model [adjusted  $R^2 = 0.38$ ,  $F(4,90) = 15.55$ ,  $P < 0.001$ ].

The third regression analysis with acceptance as dependent variable shows that neuroticism has a significant contribution to acceptance and accounted for 24% additional variance in acceptance [ $\beta = -0.49$ ,  $P < 0.001$ ,  $F_{\text{change}}(1,97) = 30.64$ ,  $P < 0.001$ ,  $R^2_{\text{change}} = 0.24$ ], the final model explained 23% of the variance of acceptance [adjusted  $R^2 = 0.23$ ,  $F(1,97) = 30.64$ ,  $P < 0.001$ ].

For these regression analyses, there were no problems as regards normality (the kurtosis of the residuals was not significantly different from zero), variance constancy or curvature. The Variance Inflation Factors did not indicate collinearity problems.

**Path analysis (structural equation model).** The critical ratio  $-0.99$  given for the multivariate kurtosis by AMOS was not significant at the 5% level, showing that the maximum likelihood algorithm was appropriate to carry out the estimation and testing.

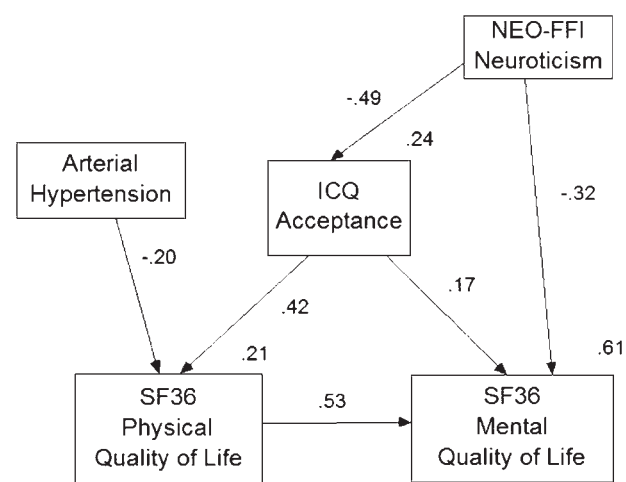
The model showed that acceptance and neuroticism are significant predictors of MHQL, they explain 61% of the variance. Neuroticism is directly and negatively related to MHQL and indirectly by the mediation of acceptance; 37% of the total effect of neuroticism on MHQL was mediated by acceptance. Neuroticism explained 24% of the variance of acceptance (Figure 1).

## Discussion

The objectives of our study were (i) to examine if acceptance is positively associated with PHQL and MHQL in patients with CKD and (ii) whether personality characteristics influence acceptance and PHQL and MHQL even after controlling for some putative confounding variables and if neuroticism has a negative effect on acceptance and MHQL.

Results of the first aim of our study revealed that acceptance was predictive of a better PHQL and MHQL in our sample of patients with CKD. Adaptive coping is considered essential in improving HQL, which is an important outcome in the care of patients with CKD. Research shows that a poor HQL significantly correlates with less compliance and increased risks of mortality in end-stage CKD patients, irrespective of kidney function [2, 4, 48].

Disability due to CKD is linked to a low HQL and depression in CKD populations [6, 11, 13, 16]. As depression and low HQL are linked to the absence of appropriate coping behaviour, it is important to focus also on adequate coping strategies in this population [21, 49]. The results of our study indicate that a better HQL might be achieved by training patients with CKD to adopt a more



**Fig. 1.** Path analysis. Goodness-of-fit values:  $\chi^2 = 2.34$  ( $df = 4$ ), not significant (n.s.):  $P = 0.67$ , GFI = 0.99, AGFI = 0.96, CFI = 1, RMSEA = 0.00, CAIC = 63.43. All fit values are acceptable. Standardized  $\beta$  coefficients (all regression coefficients are significant) and  $R^2$  values are shown, with  $R^2$  values shown above each variable.

‘accepting accommodative coping’, in order to adjust to the difficulties and impairment of their chronic disease.

The second aim of our study was to explore the influence of personality characteristics on acceptance and health quality of life. A previous study in CKD has already highlighted the idea of considering personality to better understand the adjustment process [50]. In this study, more neurotic personality characteristics were associated with less acceptance, both related to MHQL.

Considering possible putative confounding variables, age, gender, severity and duration of disease seem to have no impact on these results, only arterial hypertension as most frequent co-morbidity seemed to have a slight influence on PHQL. In our sample, 54 of the 99 patients had arterial hypertension. The fact that arterial hypertension had a relation with PHQL is in line with clinical practice: a lot of CKD patients struggle with arterial hypertension and although there is no great disability, they have to take daily medication and therefore they feel sick.

Our results show that neuroticism is inversely associated with acceptance and MHQL in CKD. This emphasizes the need for psychological assessment with extra attention for acceptance and personality characteristics at an early stage of the multidisciplinary treatment of CKD patients in order to recognize and treat these psychological aspects because of its impact on MHQL and on future treatment regimes. Neuroticism is a personality characteristic (characteristic patterns of thinking, feeling and behaviour) defined as ‘a person’s level of distress over a period of time, associated with greater symptom awareness and a vulnerability to experience negative emotions’ [51, 52]. The association between neuroticism and coping is thought to be reciprocal, with an independent influence of both on physical and mental health quality of life [34, 47, 53]. As the higher levels of neuroticism are associated with inflexibility, withdrawal, passivity, wishful thinking, negative emotion focus, mental disorders and less adaptive coping [54, 55], it is not



unexpected that a higher degree of neuroticism is negatively associated with acceptance. Acceptance is described as 'a central concept in an accommodative coping strategy' and is indispensable in adjusting life goals as a response to an unchangeable event [19]. CKD is a complex progressive disease. A patient with CKD is faced with constant adjustments to changes in medication, treatment strategies and role patterns with increasing dependence on medical equipment and on his/her environment. Such a patient therefore needs an individualized prescription of treatment by a specialist. This prescription is often different to prescriptions for other patients, who have, according to the view of the patient, a similar disease. Furthermore, treatment can change substantially from one extreme to another during the course of their disease, either because the disease progresses or because of other factors. Adjusting well to these changing treatment protocols assumes acceptance of the disease and flexibility in reorganizing their lives. The results of our study imply that patients, who are more neurotic, might experience more difficulties with acceptance. This suggests that difficulties in coping with the disease might not only be due to the different adjustment tasks associated with the type of the disease but are also influenced by personality characteristics.

The finding that neurotic personality characteristics not only influence acceptance (accommodative coping style) but also the MHQL of CKD patients can be explained by the relationship between neuroticism and the perception of health; lower neuroticism being associated with the perception of better health [40, 56]. Similarly, a recent study in CKD patients after transplantation [57] shows that lower neuroticism is associated with a higher PHQL and MHQL.

Our study has some limitations. Most importantly, as this study was cross-sectional, it cannot determine causality. It is possible that as a consequence of a good mental health quality of life, patients are using the 'accepting coping strategy' more and have a lower neurotic score. It may therefore be worthwhile to determine if psychological interventions can train people to use an accepting coping strategy, which results in changes in mental quality of life.

A further limitation was that our sample size was relatively small and consisted nearly completely of Caucasians from a single region. As such, we must be cautious in generalizing the results. Our sample size is comparable with studies on HQL where different subscales have been used.

The strength of this study and its main clinical contribution lie in the demonstration of the impact of psychological variables on HQL in CKD patients. This finding underlines the value of a psychological assessment in the care of these patients [58]. A more thorough psychological assessment of these variables may lead to a specific approach and interventions to improve patient's quality of life, which may consequently lead to better medical outcomes and reduced hospitalization [2–4, 58].

For this population, the perceived support of their nephrologist is an important predictor for patient's compliance and outcome [59] and a more holistic approach by nephrologists may help the most appropriate choice of treatment to be made.

Research that contributes to a better understanding of the psychological determinants of HQL in CKD can have

important clinical implications because it can initiate an alternative approach to these patients by nephrologists, specific psychological interventions and other supporting public health services. More studies are needed on which specific interventions are effective in improving acceptance and HQL in this population.

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(See related article by Chan. The effect of acceptance on health outcomes in patients with chronic kidney disease. *Nephrol Dial Transplant* 2013; 28: 11–14.)

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